CLAIMS

What is claimed is:

1. A color gradient generation system comprising:

an input component that receives information associated with at least one boundary curve, zero or more feature curves and colors associated with the boundary curve(s) and the feature curve(s); and,

a gradient generator that generates a color gradient based, at least in part, upon the boundary curve(s), the feature curve(s) and the colors associated with the boundary curve(s) and the feature curve(s).

2. The system of claim 1, wherein the colors are represented in one of grayscale color space; red, green, blue (RGB) color space; hue, saturation and value (HSV) color space; hue, lightness and saturation (HLS) color space; CIE L*a*b* color space; CIE XYZ color space; cyan, magenta, yellow, black (CMYK) color space; and a spectral basis function color space.

3. The system of claim 1, at least some of the information received by the input component being based, at least in part, upon user input from at least one of a keyboard, a personal digital assistant, a tablet personal computer, a touch screen, a mouse, a joy stick, a graphic tablet and a pointing device.

4. A color gradient generation system comprising:

an input component that receives information associated with at least one boundary curve, zero or more feature curves and colors associated with the boundary curve(s) and the feature curve(s);

an intermediate representation component that provides an intermediate approximation of the boundary curve(s) and the feature curve(s) based, at least in part, line segments approximating the boundary curve(s) and the feature curve(s); and,

a gradient generator that generates a color gradient based, at least in part, upon the line segments approximating the boundary curve(s) and the feature curve(s) and the

colors associated with the boundary curve(s) and the feature curve(s), the gradient generator further employing an interpolation method to generate the color gradient.

5. The system of claim 4, the color gradient stored in a regular grid representation.

6. The system of claim 4, the color gradient stored as a triangulation representation with colors defined at vertices of triangles.

7. The system of claim 4, wherein the gradient generator employs a vector-based interpolation method.

8. The system of claim 7, wherein the intermediate representation component provides the intermediate representation based, at least in part, upon polylines used to approximate at least one of the boundary curve(s) and the feature curve(s).

9. The system of claim 4, wherein the gradient generator employs a partial differential equation interpolation method, the color gradient being based, at least in part, to a solution to a partial differential equation.

10. The system of claim 9, wherein the boundary curve and the feature curve are rasterized onto a bitmap by the intermediate representation component.

11. The system of claim 9, the partial differential equation interpolation method being based, at least in part, upon Laplace's equation.

12. The system of claim 9, the solution to the partial differential equation being based, at least in part, upon a finite differences approach.

13. The system of claim 9, the solution to the partial differential equation being based, at least in part, upon a successive over-relaxation approach.

14. The system of claim 9, the solution to the partial differential equation being based, at least in part, upon a multi-grid solver approach.

15. The system of claim 14, wherein dynamic re-calculation of the solution to the partial differential equation at a higher resolution is provided by applying a multi-grid step to obtain a refinement of the initial solution to the partial differential equation.

16. The system of claim 9, wherein the intermediate representation component provides an intermediate representation based, at least in part, upon a raster grid utilized to approximate at least one of the boundary curve(s) and the feature curve(s).

17. The system of claim 9, wherein the color gradient is regenerated based, at least in part, upon the solution to the partial differential equation being re-calculated and solved at a higher resolution.

18. The system of claim 17, wherein the re-calculation is based, at least in part, upon a display resolution.

19. The system of claim 9, wherein the solution to the partial differential equation is triangulated.

20. The system of claim 19, wherein the triangulation is employed for at least one of rendering and re-calculating the solution to the partial differential equation at a higher resolution.

21. The system of claim 4, wherein the boundary curve(s) and the feature curve(s) are non-intersecting.

22. The system of claim 4, the input component receiving a plurality of intersecting boundary curves and/or feature curves, wherein the input component separates the plurality of intersecting curves into a set of non-intersecting curves.

23. The system of claim 4, wherein at least one of the boundary curve(s) and the feature curve(s) is represented as a cubic Bézier curve, a polyline, a solution to an implicit equation and a parametric curve.

24. The system of claim 4, wherein the input component receives information associated with the boundary curve(s) and the feature curve(s) in two-dimensions.

25. The system of claim 4, wherein the color gradient is resolution independent.

26. The system of claim 4, wherein the colors are represented in one of grayscale color space; red, green, blue (RGB) color space; hue, saturation and value (HSV) color space; hue, lightness and saturation (HLS) color space; CIE L*a*b* color space; CIE XYZ color space; cyan, magenta, yellow, black (CMYK) color space; and a spectral basis function color space.

27. The system of claim 4, at least some of the information received by the input component being based, at least in part, upon user input from at least one of a keyboard, a personal digital assistant, a tablet personal computer, a touch screen, a mouse, a joy stick, a graphic tablet and a pointing device.

28. The system of claim 4, the gradient generator performing at least one refinement of the color gradient.

29. A color gradient generation system comprising:

an input component that receives information associated with at least one boundary surface, zero or more feature surfaces and colors associated with the boundary surface(s) and the feature surface(s);

an intermediate representation component that provides an intermediate approximation of the boundary surface(s) and the feature surface(s) based, at least in part, on surface segments approximating the boundary surface and the feature surface; and,

a gradient generator that generates a color gradient based, at least in part, upon the surface segments approximating the boundary surface(s) and the feature surface(s) and the colors associated with the boundary surface(s) and the feature surface(s), the gradient generator further employing an interpolation method to generate the color gradient.

30. A general gradient generation system comprising:

an input component that receives information associated with at least one boundary curve or boundary surface, zero or more feature curves or feature surfaces, and a scalar-valued or vector-valued field defined on the boundaries and features;

an intermediate representation component that provides an intermediate approximation of the boundaries and features; and,

a gradient generator that generates a scalar-valued or vector-valued field throughout the interior of the region defined by the boundaries, matching the input scalar-valued or vector-valued field where it is defined on the boundaries and features.

31. A vector-based interpolation method facilitating a color gradient comprising:

approximating one or more input boundary curves and zero or more feature curves with line segments; and,

triangulating a resulting graph formed by a set of vertices and edges defined by the line segments.

32. The method of claim 31, further comprising at least one of the following acts:

determining whether one or more refinement criteria have been met;

if the refinement criteria have not been met, refining the triangulation by adding new vertices, edges, and triangles wherever refinement is deemed necessary; and,

smoothing the color and position of each newly created vertex, based, at least in part, on the colors and positions of surrounding vertices.

33. The method of claim 32, the refinement criteria being based, at least in part, upon:

$$ShouldRefine(t) = \left\|\max(\Delta c_i)\right\|^2 > (\Delta_{max})^2,$$

where t is a triangle,

Δ_{max} is a threshold, and,

$\Delta c_i = c_{0i} - c_{1i}$, with c_{0i} and c_{1i} defined as an average color across a diagonal formed by the quadrilateral of two triangles neighboring the $i^{\underline{th}}$ edge.

34. The method of claim 32, the refinement of the triangulation being accomplished by adding a new vertex located at the centroid of each triangle in need of refinement.

35. The method of claim 32, the smoothing of vertex positions and/or colors being accomplished using Laplacian smoothing.

36. A partial differential equation interpolation method facilitating a color gradient comprising:

rasterizing an input curve onto a bitmap;

generate a color gradient based, at least in part, upon a solution to a partial differential equation;

determining whether the partial differential solution is finished and/or an error is less than a threshold value; and,

re-generating the color gradient, if the partial differential solution is not finished and the error is not less than the threshold value.

37. A method of generating a color gradient comprising:

receiving information associated with an input path;

receiving a request for the color gradient to be generated; and,

generating the color gradient based, at least in part, the input path information.

38. A method of generating a color gradient comprising:

receiving information associated with an input path;

approximating the input path with line segments;

converting the line segments into three, four or five-dimensional line segments;

utilizing a multi-dimensional smooth surface fitting/reconstruction algorithm to generate the color gradient; and,

providing the color gradient.

39. A data packet transmitted between two or more computer components that facilitates generation of a color gradient, the data packet comprising:

information associated with a color gradient, the color gradient being based, at least in part, upon at least one boundary curve, zero or more feature curves and colors associated with the boundary curve(s) and the feature curve(s), the color gradient further being generated based, at least in part, upon an interpolation method.

40. A computer readable medium storing computer executable components of a color gradient generation system, comprising:

an input component that receives information associated with at least one boundary curve, zero or more feature curves and colors associated with the boundary curve(s) and the feature curve(s);

an intermediate representation component that provides an intermediate representation of the boundary curve(s) and the feature curve(s); and,

a gradient generator component that generates a color gradient based, at least in part, upon the intermediate representation of the boundary curve(s) and the feature curve(s) and the colors associated with the boundary curve(s) and the feature curve(s), the gradient generator further employing an interpolation method to generate the color gradient.

41. A color gradient generation system comprising:

means for receiving information associated with at least one boundary curve, zero or more feature curves and colors associated with the boundary curve(s) and the feature curve(s);

means for providing an intermediate representation of the boundary curve(s) and the feature curve(s); and,

means for generating a color gradient based, at least in part, upon the intermediate representation of the boundary curve(s) and the feature curve(s) and the colors associated with the boundary curve(s) and the feature curve(s), the means for generating a color gradient further employing an interpolation method to generate the color gradient.